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March 6, 1995

Mr. William F. Caton  
Secretary  
Federal Communications Commission  
1919 M Street, N.W.  
Washington, DC 20554

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Re: WRC '95 Second NOI; IC Docket No. 94-31

Dear Mr. Caton:

Transmitted herewith, on behalf of Iridium, Inc., are an original and nine copies of Iridium, Inc's comments in connection with the Commission's Second Notice of Inquiry in IC Docket No. 94-31, concerning U.S. proposals for WRC '95.

If further information is desired concerning this matter, please contact the undersigned.

Very truly yours,

  
James G. Ennis  
Director, Licensing Affairs

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Before the  
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IC Docket No. 94-31

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**Comments of Iridium, Inc.**

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## **SUMMARY**

In these comments, Iridium, Inc. ("Iridium") urges that the following be incorporated in the U.S. objectives for WRC '95:

- (1) Clarify RR Footnote 731E as it applies to the 1610-1626.5 MHz band by identifying the EIRP density values -3dB(W/4kHz) and -15dB(W/4kHz).
- (2) Either suppress entirely or maintain RR Footnote 733E as currently written, but not suppress it and replace it with the protection rules in the "Big Leo" Report and Order.
- (3) In the band 1626.5-1631.5 MHz, upgrade the current allocation in Region 1 to generic MSS.
- (4) Delete the subband 1626.5-1631.5 MHz from the scope of RR Footnote 726C.
- (5) Create a co-primary MSS allocation (Earth-to-space) in the band 1675-1710 MHz in Regions 1 and 3.
- (6) Suppress RR Footnote 735A as it applies to the band 1675-1710 MHz.

(7) Modify (without increasing) the current international MSS allocation at 2 GHz found in the ITU's Table of Allocations by replacing spectrum rendered unusable for MSS by virtue of the FCC's domestic PCS decision with an equal amount of alternative spectrum.

(8) Maintain the current date of 2005 for entry-into-force of the 2 GHz MSS allocation outside the U.S.

(9) Change Resolution 46 and the VGE Report in various respects to facilitate coordination of MSS systems.

(10) Adopt the second option identified in a TG 4/5 document as the proper approach for accommodating non-GSO MSS feeder links in specific frequency sub-bands in FSS allocations above 17.7 GHz.

(11) Establish a power density limit of 24 dBW/MHz for FS operations transmitting more than two degrees above the horizon and operating in the MSS feeder link band from 29.0-29.5 GHz.

(12) Establish a power density link of 24 dBW/MHz for FS operations transmitting more than two degrees above the horizon and operating in the intersatellite link band 22.55-23.55 GHz.

(13) Modify the preliminary agenda for WRC '97 to specify that MSS service links as well as feeder links are subjects for new allocations at WRC '97.

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**Comments of Iridium, Inc.**

Iridium, Inc. ("Iridium") hereby offers its comments in response to the Federal Communications Commission's (Commission's) Second Notice of Inquiry ("Second NOI") released January 31, 1995 in the above-captioned proceeding.

In its Second NOI, the Commission reaches a tentative conclusion in some areas concerning U.S. proposals for WRC '95. It seeks additional information relating to the WRC' 95 agenda, the recommended agenda for WRC '97, and the preliminary agenda for WRC '99.

On January 31, 1995, Motorola received authority to construct, launch, and operate the IRIDIUM® low-earth-orbit ("LEO") satellite

system, which will provide mobile-satellite service ("MSS") using MSS spectrum in the 1610-1626.5 MHz band, combined with FSS spectrum in the 29.0-29.5 and 19.2-19.7 GHz bands for its feeder links. Motorola will initially operate the IRIDIUM® system for the benefit of Iridium, Inc., a U.S. corporation owned by seventeen strategic international investors. Consequently, Iridium, Inc., has a substantial interest in issues that are on the agenda for WRC '95, and that might be considered at WRC's '97 and '99, concerning current and future MSS spectrum and associated feeder link allocations.

## **OVERVIEW**

Motorola was one of three applicants that received authority from the FCC in January 1995 to construct a non-GSO MSS system operating in part of the 1610-1626.5 MHz band. The other two licensees are Loral/Qualcomm Partnership, L.P. (with respect to the Globalstar system), and TRW Inc (for the Odyssey system). In addition, it is possible that three other applicants, AMSC,

Constellation and CHI (formerly Ellipsat) whose applications were deferred by the FCC until January 1996, may also receive construction permits to use this spectrum.

During the MSS proceeding, Motorola sought 10.5 MHz of spectrum in the 1610-1626.5 MHz band to meet the IRIDIUM® business plan. It accepted the eventual assignment of a much smaller amount of spectrum for U.S. service (5.15 MHz from 1621.35-1626.5 MHz) because the possible alternative, spectrum auctions, would have been contrary to the public interest and unacceptable for a global MSS system, and because the IRIDIUM® system can meet the initial demand for service it anticipates in the U.S. with 5.15 MHz of spectrum. Nevertheless, 5.15 MHz of spectrum for use in the U.S. will not be sufficient spectrum for very long. Additional spectrum will clearly be important to meet anticipated future growth in demand for service from the IRIDIUM® system. This is probably also true for the other MSS licensees and applicants in the 1610-1626.5 MHz band.

To relieve the current congestion in the L-band, and to facilitate implementation of recently licensed MSS systems, Iridium proposes

that the following changes be made to the current MSS and feeder link allocations and related regulatory provisions at WRC '95. In addition, certain modifications should be considered to the preliminary agenda for WRC '97.

### **PROPOSALS**

(1) 1610-1626.5 MHz band: Modification of Footnote 731E.

Iridium fully supports the Commission's proposal to change Footnote 731E in the ITU Radio Regulations to make clear that the EIRP power density values presented therein are "mean" values.

However, the language proposed by the FCC to accomplish this objective (presented in an appendix to the Second NOI as Mod 731E<sup>1</sup>) adds the word "mean" only with respect to the EIRP power density value -15dB (W/4 kHz). The word "mean" also needs to be added to the sentence that discusses the EIRP power density value -3dB(W/4 kHz). Thus, that sentence should read: "In the part of the

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<sup>1</sup>Proposal No. 3/B/LEO, at 7.

band where such systems are not operating, a mean value of -3dB (W/4 kHz) is applicable."

(2) 1610-1626.5 MHz band: suppression of 733E. The Commission asks (Second NOI, at para. 24-27) whether footnote 733E should be suppressed and replaced by the protection rules embodied in the Report and Order on Big Leo's. Iridium supports the suppression of Footnote 733E but opposes replacing it with the protection rules in the Big Leo Report and Order. The rules negotiated in the "Big Leo" proceeding (which only pertain to MSS uplinks in the 1610-1626.5 MHz band) were site-specific. Although they may provide a good starting point for negotiations with radio astronomers in other countries, they are not necessarily universally applicable, and should therefore not be raised to the level of a regulatory requirement.

(3) 1626.5-1631.5 MHz band: Generic MSS allocation  
Since the band from 1626.5-1631.5 MHz is adjacent to the 1610-1626.5 MHz band, it is optimum spectrum for MSS systems employing the 1610-1626.5 MHz band to use for future growth. The

U.S. should seek to make this 5 MHz of spectrum usable by all MSS systems.

The 5 MHz of spectrum from 1626.5-1631.5 MHz is currently allocated in Regions 2 and 3 to generic MSS. In Region 1, the band is allocated to MMSS on a primary basis and LMSS on a secondary basis. Iridium does not oppose the Commission proposal to upgrade the Region 1 MSS allocation in this 5 MHz, as well as the corresponding Region 1 MSS downlink allocation at 1525-1530 MHz, to a primary generic MSS allocation. However, it should be noted that if necessary, MSS systems can operate globally under the current allocation. In other words, this improvement is not critical in order for MSS systems to be able to use the band.

(4) 1626-1631.5 MHz band: Modify RR Footnote 726C by deleting the 1626.5-1631.5 MHz from the scope of Footnote 726C.

Footnote 726C imposes GMDSS requirements on seven countries -- five in Region 2 and two in Region 3 -- that use the 19 MHz band (from 1626.5-1645.5 MHz) and the 14 MHz band (from 1530-1544 Mhz for primary MSS service. The footnote is designed to ensure that even when these countries use these bands for MSS

generally, they continue to protect maritime mobile satellite safety-of-life services operating in these bands.

Now the commission proposes to extend this same protection to any new band where the generic MSS allocation replaces the MMSS allocation. As a general matter, Iridium does not oppose this proposal. However, it requests that the GMDSS requirement in Footnote 726C be deleted across the board for the 5 MHz band 1626.5-1631.5 MHz, so that the GMDSS requirement would not be imposed on this 5 MHz with respect to the seven countries to which Footnote 726C already applies and any more to which it may be applied, either in Region 1 or in other countries in Regions 2 and 3.

There are excellent public interest reasons to remove the subband 1626.5-1631.5 MHz from the scope of Footnote 726C. First, GMDSS is not currently being provided in this 5 MHz. Second, the limited applicability of the GMDSS requirement in this band renders it valueless as a safety-of-life service. It is not applicable in Regions 2 and 3 except in the vicinity of seven countries. The Table of Allocations does not similarly restrict the downlink band (1525-1530 MHz) with which this band is paired.

Iridium proposes that the GMDSS requirement be eliminated only from the 5 MHz from 1626.5-1631.5 MHz, not from the 1631.5-1645.5 MHz band. The requirement would continue to remain in place for the 1631.5-1645.5 MHz band as well as for the downlink band that is paired with it from 1530-1544 MHz. 28 MHz is more than enough spectrum to meet the needs of maritime distress and safety communications.

Footnote 726C today effectively prevents systems other than Inmarsat from using the 1526.5-1531.5 MHz band to provide MSS. This is very much against the public interest. Inmarsat already has access to 68 MHz of spectrum, which it currently uses very inefficiently. It serves approximately 35,000 users in all this spectrum. By contrast, the IRIDIUM® system, with only 5.15 MHz of spectrum initially, expects to accommodate over a million subscribers. Other non-GSO MSS systems claim similar efficiencies. Given the scarcity of MSS spectrum, and the inefficiency with which Inmarsat is using the spectrum it is currently registered to use, the 5 MHz of spectrum from 1626.5 to 1631.5 MHz should be made available for use by competitive MSS systems, by deleting it from the

scope of the GMDSS requirement in Footnote 726C.

Consequential amendments to the Radio Regulations should be proposed to ensure that GMDSS will not be required in Region 1 in this 5 MHz subband.

(5) 1675-1710 MHz band: Co-primary MSS allocation in all ITU regions. The 1675-1710 MHz band is currently allocated for MSS uplinks only in Region 2. Iridium supports the Commission's proposal (Second NOI at para. 61) to extend this co-primary allocation to Regions 1 and 3.

(6) 1675-1710 MHz band: Delete Footnote 735A. Although nominally a co-primary service, MSS is effectively rendered secondary in Region 2 by virtue of RR Footnote 735A, which states that MSS shall not cause harmful interference to, or constrain the future development of, the Metsat/Metaids service. In the Second NOI, the Commission proposes that "if appropriate sharing criteria" are developed and approved between MSS and Metsats, or between MSS and Metaids, this footnote could be modified to eliminate MSS's

secondary status in Region 2 with respect to Metsats, or Metaids, or both<sup>2</sup>.

Iridium urges that Footnote 735A be suppressed because it is unnecessary to protect current Metsat and Metaid systems beyond their current co-primary status. Moreover, to continue to provide unconditional super-primary status to future Metsat and Metaid systems is counter-productive to efficient use of the spectrum. The super-primary status for future systems will not encourage developers of such systems to employ spectrum-efficient techniques. In fact, just the opposite will be true. Unless Footnote 735A is deleted, future Metsat and Metaids systems may well be developed using techniques that inhibit fair sharing of the spectrum and thereby avoid the inconvenience of coordinating with MSS systems. This "temptation" should be removed from the Radio Regulations by deleting Footnote 735A.

It has been agreed in WP7C (WP 7C/Temp/4 (Rev. 2)) that Metsat systems do not use some frequencies in the 1675-1710 MHz

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<sup>2</sup> Second NOI, p. 14, n.39.

bands and Metsat systems' use of other frequencies in the band needs to be protected only within 40 Km of a few data collection earth stations such as those at Wallops Island, VA, and a few sites in Europe, Russia and Japan. Co-primary status alone is sufficient to protect these sites. Therefore, at least with respect to Metsat systems, Footnote 735A should be deleted.

Protection of Metaid systems (i.e., radiosondes) in the 1675-1700 MHz band is more complicated but there is no reason to believe the band cannot be shared. In most of the world, the band is very lightly used by radiosondes, if at all. Only 20 percent of the radiosondes in the world today employ this band. (The other 80 percent of radiosondes in the world use the 400 MHz band).

Moreover, more than half of this usage is in the U.S. and other nations in Region 2 whose use of radiosondes is subsidized by the U.S. government. Thus, it is readily seen that use of the 1675-1700 MHz band for radiosondes outside Region 2 is quite small.

Therefore it seems reasonable to believe that sharing this band between MSS and Metaid systems should be much simpler in Regions 1 and 3 than it is in Region 2.

As WP7C has indicated in recent Liaison Statement (7C/Temp/\_\_\_\_) WP8D sharing studies will be undertaken between Metaid and MSS services. There is no reason to expect that such studies will not be fruitful and Footnote 735A cannot be deleted with respect to Metaid systems as well.

(7) 2 GHz band: Changing the MSS allocation. WRC '92 allocated 40 + 40 MHz in the following 2 GHz bands for MSS on a primary basis:

- Reg 2: 1970-1980 MHz (Earth-to-space)/2160-2170 MHz (space-to-Earth)
- Global: 1980-2010 MHz (Earth-to-space)/2170-2200 MHz (space-to-Earth)

After WARC '92, the Commission decided to allocate the 1970-1990 MHz band domestically to terrestrial PCS. This action effectively rendered 20 MHz of uplink spectrum useless for MSS in the U.S. and orphaned the corresponding downlink (2160-2180 MHz).

The U.S. should seek to find spectrum for global MSS systems to replace that which was rendered unavailable by the FCC's PCS decision. The demand for MSS spectrum is at least as great now as

it was in 1992, and non-GSO MSS licensees and applicants in the 1610-1626.5 MHz band need to be able to use the 2 GHz band beginning sometime after the year 2005 (after the spectrum becomes available for global MSS use) for next generation systems. Indeed, applications and petitions have already been filed with the FCC to use this spectrum for MSS.

For these reasons, Iridium supports the FCC's proposal (at Second NOI, Table 5 and para. 62) that the following changes be made at WRC '95 to the 2 GHz band MSS allocation:

- Allocate the band 2010 -2025 MHz to global MSS (Earth-to-space);
- Expand the 2165-2170 MHz (space-to-Earth) band from a Region 2 allocation to a global (Regions 1,2,3) allocation;
- Delete the MSS uplink allocation from the 1970-1985 MHz band.

The net result of these changes would restore the allocation of 40 + 40 MHz (1985-2025 MHz (Earth-to-space)/2160-2200 MHz (space-to-Earth) at 2 GHz for global MSS use.

(8) 2 GHz band: Advancing the date of entry-into-force of the MSS allocation. Currently (pursuant to RR Footnote 746B), the regional and global MSS allocations at 2 GHz (1970-2010 MHz/2160-2200 MHz) enter into effect on January 1, 2005, everywhere in the world except in the U.S., where (by virtue of RR Footnote 746C) they enter into effect nine years earlier, on January 1, 1996. The FCC proposes that the new 2 GHz allocation should also be subject to Footnotes 746B and 746C.

Iridium believes the date-of-entry for global use of the current 2 GHz MSS band should remain at 2005. The 2005 date was selected to protect current FS operations in the band, and Iridium believes that nothing has occurred in the intervening period since 1992 to change the validity of that rationale.

One argument that is made by other countries in favor of advancing the global date is that somehow U.S. systems will gain a "headstart" on the rest of the world because of Footnote 746C. Iridium has difficulty understanding how, as a practical matter, an MSS system could provide service over the U.S. pursuant to Footnote 746C prior to 2005. The footprint of any such system would

have to impinge on the territories of (at least) Canada and Mexico, whose fixed service operations are entitled to protection until the global date for the MSS allocation takes effect (i.e., until 2005). Because of Footnote 746B, Canadian and Mexican fixed service systems would have an absolute right to protection in bilateral negotiations or from the ITU. As a practical matter, therefore, there does not seem to be any basis for the concern expressed by other countries in this regard.

(9) Resolution 46 Changes. The Commission (Second NOI at para. 44) requests proposals for a comprehensive "package" of Resolution 46 changes.

As an initial matter, Iridium believes Resolution 46 should be modified as a stand-alone document, even if it is later incorporated into the VGE simplified regulations. Common sense suggests that it is much easier to work with the interrelated provisions in Resolution 46 while they are integrated into a simple comprehensive document than it would be after they are dispersed in the VGE report.

Second, Iridium supports all but one of the changes to Resolution 46 identified by the Commission in paragraph 41 of the Second NOI. In particular, Iridium supports:

- Adopting different pfd and/or FDP thresholds instead of RR 2566 for specific bands identified by TG 2/2;
- Modifying RR 731E to specify that the maximum EIRP limits are based on the use of "mean" (as opposed to "peak") values;
- Modifying Section 2.5 of Resolution 46 (coordination with terrestrial services) with a new methodology to be used to avoid coordination with terrestrial services;
- Modify Section 2.1 of Resolution 46 to provide a specific method to calculate coordination regions which would identify affected assignments with which coordination should take place.

However, Iridium does not support the last FCC proposal in paragraph 41, namely, revising Note 1 of Resolution 46, Section III, by replacing the current definition of "coordination area" with a new methodology contained in recommendation ITU-R IS 847. ITU-R IS

847 is not currently applicable to handheld satellite subscriber units. (By contrast, ITU-R IS 850 could be used for feederlinks). This idea expressed in ITU-R IS 847 may have validity, but the recommendation needs to be reworked before the U.S. proposes that it be incorporated in Resolution 46.

In addition, Iridium also proposes that Section 2 of Resolution 46 should be changed to state that if an Administration does not respond to publication of notice within six months, it is deemed to have agreed to the proposal. This is what the VGE simplified regulations state. This view is also supported by the French Administration in a submission to the Working Party of the CPM in January 1995 (see Document 17, p. 19, Add. 5).

Iridium believes that the Commission's statements in paragraph 42 of the Second NOI are correct, and that non-GSO MSS applicants should provide the information the Commission has identified as missing from current Appendix 3 in connection with their current Appendix 3 filings.

In addition, Iridium believes that Article S9.29 and S9.30 of the VGE Report lack clarity and should be replaced with a simple text

which says "when an Administration wishes to notify a system, it shall either (a) send copies to all countries or (b) send a copy to the Radiocommunication Bureau ." TG 8/3 has recommended to the CPM (Doc. TG 8/3-Temp/64) that the Resolution 46 method is the preferred method for notifying non-GSO systems under S9.30. The above text reflects that recommendation.

(10) Feeder link issues: Modify RR 2613 Applicability. As the Commission points out (Second NOI at para. 49), TG-4/5 identified potential approaches for accommodating non-GSO MSS feeder links in specific frequency sub-bands in FSS allocations above 17.7 GHz. Two options are identified in the TG 4/5 document (ITU-R Document 4-5/Temp/32 (Rev. 1)-E at 3) referenced by the Commission. Iridium endorses the second of these two options. This option, which is also described in the draft CPM report, proposes (at Chapter 2, Part C, Sect. 3.5.1 at 3d para; p. 52) that RR 2613 would not be applied in specific identified bands, including the 19.2-19.7 and 29.0-29.5 GHz band. Existing GSO systems would have equal status with non-GSO systems in these bands, but future GSO systems would need to protect non-GSO MSS feederlinks.

The specific language that Iridium proposes for adoption is provided in Appendix 1 hereto<sup>3</sup>. It is recommended that the U.S. propose this language for the bands 19.2-19.7 GHz and 29.0-29.5 GHz.

(11) Feeder Link issues: Establish EIRP limit on FS operations. In addition to the issues identified by the Commission concerning feeder links, Iridium proposes that a power density limit of 24 dBW/MHz be imposed on fixed service (FS) systems transmitting more than 2 degrees above the horizon and operating in the band 29.0-29.5 GHz. Currently, Article 27, RR 2505 limits the power of

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<sup>3</sup>On a related matter, Iridium has two comments on Table 2 of the Commission's Second NOI, (entitled "Candidate Bands for NGSO MSS Feeder Link Spectrum") (Second NOI at pp 27-29). First, the table indicates that with respect to the 19.2-19.7 GHz band, bi-directional sharing (i.e., reverse band working) is possible. No studies have demonstrated to the satisfaction of Iridium that this is feasible in this band, and it is premature to draw these conclusions. Second, note 12 to the table states that "the most logical" 500 MHz to be paired with the 19.2-19.7 GHz band from the 2000 MHz within the 27.5-29.5 GHz band is the 500 MHz from 29.0-29.5 GHz. Iridium concurs with this assessment and strongly opposes consideration of any other 500 MHz for pairing with the 19.2-19.7 GHz band. The IRIDIUM® system has been designed to use feeder link frequencies within these particular band segments (i.e., 19.4-19.6/29.1-29.3 GHz) on the basis of global spectrum occupancy in order to facilitate coordination around the world. In fact, the international coordination of this spectrum for the IRIDIUM® system has been in progress for well over two years. See CC Docket No. 92-297, NRMC 32 (August 5, 1994). Thus, any further change in the IRIDIUM® system frequency plan at this juncture would cause substantial delays in the ITU coordination process and require significant redesign efforts, with corresponding delays in the initiation of service to the public.

fixed service systems at 55 dBW. While this limit is acceptable for FS antennas in the 29.0-29.5 GHz band pointing less than two degrees above the horizon, a spectral power density of 24dBW/MHz should be imposed on such antennas while they are transmitting two degrees or more above the horizon. A similar limit is already imposed on fixed service systems to protect GSO systems (See RR 2504(a)). A new provision, RR 2504 (b), should be added to extend similar protection to non-GSO systems. Such a proposal is currently under consideration in IWG-4 and has been included in the CPM draft report at Chapter 2, Part C, Section 3.6.3; p. 55.

(12) Intersatellite Link Issues. For the same reasons presented above with respect to protection of non-GSO intersatellite links from interference from co-frequency FS systems, the same restriction (a power density limit of 24 dBW/MHz for fixed service antennas transmitting more than two degrees above the horizon) should be adopted for fixed service systems operating in the intersatellite allocation from 22.55-23.55 GHz.

(13) WRC '97 Issues. Iridium endorses maintaining Resolves 3 and 3.1 of the preliminary agenda for WRC '97. These provisions